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A
DISSERTATION
UPON
EARTHQUAKES,
THEIR
CAUSES and CONSEQUENCES;

COMPREHENDING

An Explanation of the Nature and Composition of subterraneous Vapours, their amazing Force, and the Manner in which they operate; the Sentiments, on this Head, of the most learned Philosophers ancient and modern; the different Kinds of Earthquakes, distinguished by their Effects; a copious Collection of authentick Relations digested under those Titles, the greater Part of which have happened in GREAT BRITAIN.

TOGETHER WITH

A distinct Account of, and some Remarks upon, the Shock of an EARTHQUAKE, felt in the Cities of LONDON and WESTMINSTER, on *Thursday, February 8, 1749-50.*

L O N D O N:

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A
DISSERTATION
UPON
Earthquakes, &c.



IT is a thing obvious enough to such as have strictly considered human Nature, that all the inferior Faculties of the Mind are entirely subservient to that Kind of ruling Passion in the Soul, which as much distinguishes the Intellects of Men as their Faces are distinguished by the Difference of Features. We have a pregnant Instance of this in that Inclination of hearing new Things, which is what we term CURIOSITY.

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In a Mind, the true Character of which is Narrowness of Comprehension and Timidity, Curiosity is a low and creeping Quality, which exercises itself only in mean and dirty Enquiries; such as Tricks and Artifices in Trade, Quirks in Law, Nostrums in Physick, and Jobbs in Government. In a Mind something better constituted, and where the Passions are of a warmer Complexion, Curiosity wanders after brighter Objects; such as fine Sights, great Assemblies, or pompous Ceremonies. This Disposition, as it is influenced by Circumstances, carries a Man to Masquerades in the Winter, Horse-Races in the Summer, to *Westminster* at the Close of a Sessions of Parliament, when King, Lords, and Commons may be seen at one View, or to the Jubilee at *Rome*; where, for the Sake of gratifying such Tempers, and for the Emolument of a People, who have scarce any thing else to subsist on, a continued Series of fine Sights is contrived for a whole Year together.

In Minds of a superior Order Curiosity rises still higher, and disdaining alike the despicable Enquiries of the first, and the flashy and foolish Humour of the latter sort of People, it rises into vast
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and noble Speculations, examines the whole Superficies of the Earth, or pierces through its inmost Recesses to the very Center, examines the great Ocean, explores the Connection of particular Seas, visits the secret Conveyances of Water, and traces its wonderful Circulation to the very Tops of the highest Mountains, where breaking out into perpetual Springs, it swells by continual Accessions into great Rivers, and so rolls down again into that vast Abyfs, which, as it is considered in these different Lights, may be esteemed both a Beginning and End: Or, rising beyond the Limits of this little Globe, to which the Soul, while in the Body, is confined, it aspires to an Acquaintance with other Worlds, and expatiates through the Universe, delighted with those Discoveries here, the perfect Knowledge of which, will, in all Probability, be a Part of that Happiness reserved for rational Beings hereafter.

But as all things in this World are subject to numberless Vicissitudes, so from time to time it happens, that Events, either extraordinary in themselves, or which appear so from the Circumstances that attend them, affect al-

most all Ranks and Degrees of People, and as it were absorb the general Curiosity. A pregnant Proof of which we have in the late Shock of an Earthquake, which being in our own Times so rare in this Country, tho' not so formerly, has attracted universal notice, and become, not the common only, but almost the single Topick of Discourse.

Yet, as it may be presumed, that in a little time the Impression of this Accident may wear off, and Mankind in general return from this constrained Meditation on Earthquakes, to the Pursuit of the several Objects which naturally entertain their respective Curiosities; it seemed no unfavourable Opportunity of offering to the publick View, in as tolerable a degree of Order, as so sudden an Occasion would admit, the Thoughts of some of those superior Genii on so surprizing and important a Subject, and which Experience has convinced us, is not entirely foreign to the Age or Island in which we live.

As to the Antiquity of these wonderful Commotions, it has been the Opinion of some very learned, and, which is more to the Purpose, very wise Men, that as they are often the Causes of Destruction

struction and Confusion, so in the Hands of the omnipotent Creator, they might be the original Cause of the World itself. The first Person who published this Notion, at least as far as my Knowledge reaches, was our Countryman, the sagacious Mr. *Thomas Lydyat*, in his *Philosophical Disquisition, concerning the Origin of Fountains*, wherein, having mentioned the raising up Mountains in the Sea, by subterraneous Fires, he proceeds thus: “ After which Manner also, all the Mountains in the World, together with the Continents themselves (which are nothing but great Mountains or Islands scattered in the Ocean) in the Beginning of the World, when the Fire of which we speak was first kindled in the Bowels of the Earth by the Almighty Creator, were (as it is most highly probable) originally raised up; the Sea receding into the Cavities and depressed Places, and, by the most wise Counsel of the supreme Deity, leaving Room for terrestrial Animals to inhabit.”

This Sentiment was adopted by Dr. *Simon Patrick*, Bishop of *Ely*, in his Commentary upon *Genesis*, where, speak-

speaking of the Waters being gathered together, he says we may conceive this to have been done by such Particles of Fire as were left in the Bowels of the Earth; whereby such nitrofulphureous Vapours were kindled, as made an Earthquake, which both lifted up the Earth, and made Receptacles for the Water to run into. That learned Prelate thinks this in some measure proved by a Passage in the Psalms, where, as soon as it is said, *that the Waters stood above the Mountains*, which seems to express the Condition of this Globe at its first Creation, it is immediately added, *at thy Rebuke they fled, at the Voice of thy Thunder they hasted away*. Now we know that an Earthquake is a Kind of subterraneous Storm, or, as the *Indians* in *North America* very well express it, an under-ground Thunder.

The *Roman* Poet *Ovid*, not more esteem'd for the Vivacity of his Parts, and the Beauties of his Versification, than for the Extensiveness of his Learning, in the fifteenth Book of his *Metamorphoses*, describes the Manner in which a high Hill was elevated in a large Plain, by the Force of subterraneous Fire. This Account of his will at once illustrate

trate the Matter, and convey the easiest and clearest Conception of the Way in which this strange Birth of Nature was produced. Let us then listen to his Song.

*A Hill by Pitthœan Trœzan, Mounts uncrown'd
With Sylvan Shades, which once was level Ground,
For furious Winds (a Story to admire)
Pent in blind Caverns struggling to expire;
And vainly seeking to enjoy th' Extent
Of freer Air, the Prison wanting Vent,
Puffs up the hollow Earth extended so,
As when with swelling Breath we Bladders blow:
The Tumour of the Place remained still,
In Time grown solid, like a lofty Hill.*

That ingenious Naturalist Mr. John Ray, took a great deal of Pains to establish the Truth, or at least the Probability of this Doctrine. He gives us a parallel Instance to that beforementioned, of a much later Date, in a Hill not far from *Puzzuolo*, beside the Gulph of *Baiæ*; which, says he, I myself have viewed and been upon. It is by the Natives called *Monti di cenere*, and was raised by an Earthquake, September the Twen-
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ty-ninth 1538, of about One hundred foot perpendicular Altitude, though some make it much higher: According to *Stephanus Pigbius*, it is a Mile ascent to the top, and four Miles round at the foot; we indeed judged it not near so great. The People say it bears nothing; nothing of any Use or Profit, I suppose they mean: Else I am sure there grow Heath, Myrtle, Mastick-tree, and other Shrubs upon it. It is a spongey kind of Earth, and makes a great Sound under a Man's Feet that stamps upon it. The same Earthquake threw out so much Earth, Stones and Ashes, as quite filled up the *Lacus Lucrinus*, so that there is nothing left of it now, but a fenny Meadow.

When we say that this Mountain was raised by an Earthquake, we do not mean that the meer Succussion, or shaking of the Earth, raised up the Mountain, but that the same Cause which shook the Earth, that is, subterraneous Fire, cast up the Materials which raised the Mountain, and of which it doth consist; that is, Stones, Cinders, Earth, and Ashes. Indeed, under the Word Earthquake in this Sense, we comprehend the Concomitants and Consequences of an Earthquake, and
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the efficient Cause of it, which is a subterraneous Fire.

Neither by the Elevation of Mountains do we mean that they were all heaved up, as it were by a *Flatus* ; but only such where the inclosed Fire was not of Force sufficient to make its way out, or found not *Spiracula* to vent itself. In other places where it was strong enough to rend the superincumbent Mass of Earth, or found some Rifts or *Spiracula* to break out by ; there, it issued out with great Force, and threw up abundance of Stones, Ashes and Earth, and so raised up a Mountain that way. If such Hills I say, as these may be, and have been elevated by subterraneous Wild-fire, *Flatus*, or Earthquakes ; *si parvis liceat componere magna* ; if we may compare great Things with small, why might not the greatest and highest Mountains in the World, be raised up in the like manner, by a subterraneous *Flatus* or Wild-fire, of Quantity and Force sufficient to work such an Effect ; that is, that bears as great a Proportion to the superincumbent Weight and Bulk to be elevated, as those under these smaller Hills did to theirs ?

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But we cannot doubt this may be done, when we are well assured that the like hath been done. For the greatest and highest Ridge of Mountains in the World, the *Andes* of *Peru*, have been for some hundreds of Leagues in length, violently shaken, and many Alterations made therein, by an Earthquake that happened in the Year 1646; mentioned by *Kircher* in his *Arca Noë*, from the Letters of the Jesuits. And *Pliny* tells us, of his own Knowledge, that the *Alps* and *Apennine* have often been shaken with Earthquakes.

The same great Author assures us, that the Island *Hiera* near *Italy*, in the time of the Social War, together with the Sea itself, did burn for several Days; and *Strabo*, in the first Book of his Geography, reports, that about *Metbone* in the Bay of *Hermione*, there was Earth raised, and, as it were, blown up to the height of seven Furlongs, by a fiery Breath or Exhalation, which by Day-time was unaccessible, by reason of Heat and sulphurous Stench, but smelling sweet by Night, and shining so as to be seen a far off; likewise casting such a Heat, as to cause the Sea to boil for five Furlongs,

Furlongs, and to render it troubled for the space of twenty Day, raising up therein a Baich, or Bank of Stones as big as a Tower.

These Instances I alledge, principally, because they seem to demonstrate a Possibility of the Accension of Fire in the Earth, when it was wholly covered with Water, and had no Intercourse or Communication with the superior or external Air, which is the main and most material Objection against the Elevation of the dry Land at the beginning, by subterraneous Fires.

Some will say, if the Mountain be thus heaved, or else cast up by subterraneous Fires, the Earth must needs be hollow all underneath them, as there must be vast Dens and Caverns dispersed throughout them. To which we may answer, 'tis true indeed, so there are; as may undeniably be proved by Instances. For the new Mountain we mentioned at *Pozzuoli*, that was thus raised, being of a Mile steep ascent, and four Miles round at the Foot, a proportionable Cavity must be left in the Earth underneath: And the Mountain *Ætna*, at the last Eruption alone having disgorged out of its Bowels so great a Flood of melt-

ed Materials, at if spread at the Depth and Breadth of three Feet, might reach four Times round the whole Circuit of the terraqueous Globe ; there must likewise an answerable Vault be left within.

If it be demanded, how then it comes to pass, that they stand so firm, and do not founder and fall in, after so many Ages ? We answer, that they may stand, as appears by the foresaid new-raised Mountain. For notwithstanding the Cavity under it, it hath stood firm and staunch, without the least sinking or subsidency, for above two hundred Years, neither is there any great sinking or falling in at *Ætna* itself, at least in no Degree answerable to its ejected Matter. This Assertion is confirmed by the unanimous Vote and Testimony of all Writers, ancient and modern, who have handled this Subject.

But *Alphonsus Borellus* supposes them not to have duly considered the Matter, or calculated the Quantity of the ejected Materials, and the Bulk of the Mountain, and compared them together, but to have been carried away by the Prejudices and Persuasion of the People, who looking upon the Top of the Moun-

Mountain at a Distance, think it but a small Thing, in Comparifon of the ejected Sand and Afhes, that covered whole Countries, and thofe vaft Rivers of liquid Stones and other Ingredients, that ran down fo many Miles ; whereas he, by a moderate Computation, found, that the Total of what the Mountain difgorged at the laft Eruption, amounted not to much more than the fourteen thoufandth Part of the Solidity of the whole Mountain. The Reafon is, the Strength and Firmnefs of their Vaulture, and Pillars fufficient to fupport the fuperincumbent Weight. And yet in fome Places, there are finkings and fallings in, which have afterwards become Valleys or Pools of Water.

But as for the Cavities that are lower than the Superficies of the Ocean, the Water, where it could infinuate and make its Way, hath filled them up to that Height. We fay, where it could make its Way; for that there are many empty Cavities, even under the Sea itfelf, appears by the fhaking and heating too of the very Water of the Sea in fome Places in Earthquakes, and raifing up the Borders or Skirts of it, fo as to drive the Water a great Way back, and
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the raising up new Islands in the Middle of the Sea, as *Delos*, and *Rhodes*, and *Anaphæ*, and *Nea*, and *Alone*, and *Hiera*, and *Theru*, mentioned by *Pliny* and *Ibia* in his own Time, and *Therasia*, in the *Ægean*, in *Seneca's* Time, which was heaved up in the Sight of many Mariners, then present and looking on.

This Manner of Reasoning, shews evidently, the vast Advantages that arise from the Study of natural History; for let a Man's Understanding be ever so strong, yet if he trusts to it entirely, and attempts to account for every Thing from the Sagacity of his own Conjectures, he will make but a poor Figure in the Opinion of such, as by Reading and Experiments have acquired a Fund of real Knowledge. The Truth of this Observation, may be easily seen, by comparing the Philosophy of *Hobbes*, which was entirely the Produce of thinking, with that of *Boyle*, which rests upon the Basis of Enquiry and Experiments. But this, however, hinders not our Reasoning with the utmost Freedom, from Experiments duly made, or from Facts well proved; and therefore, having opened a Way by these, we will follow the Lights afforded us by the
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great Authors before mentioned, and by the penetrating Dr. *Hooke*, in order to receive more, tho' rough Satisfaction, how these hidden Wonders are really wrought; for that the Sources of these Fermentations, Heavings and Explofions, are in the Bowels of the Earth, the former Instances fufficiently demonstrate. These Materials we conceive to be somewhat analogous to the Materials of Gunpowder, not that they must be necessarily the very fame, either as to the Parts, or as to the Manner and Order of Composition, or as to the Way of Inkindling and Accenfion; for that, as much the fame Effect may be produced by differing Agents, fo the Methods and Order of proceeding, may be altogether as differing: A clear Instance of this we may find in the Phænomena of Lightning, wherein we may observe, that the Effects are very like to the Effects of Gunpowder.

For we have first the Flash of Light, which is very fudden, very bright, and of very fhort Continuance; being almost momentaneous, at leaft every fingle Flash is fo, tho' the kindling of feveral Parts at fome Distance from one another, does fometimes continue a Succeffion, or
longer

longer Duration of the Light. Next we may observe, the Violence of the Crack or Noise, which is likewise as momentaneous as the Fire if it be single; but if there be many particular Flashes that contribute to this Effect, and those made at several Distances, then the Duration of the Thunder heard, is longer than the Duration of the Flashes of Lightning, which proceeds, as we conceive, from two Causes: First, for that those Flashes that are farther distant have their Thunder a longer Time in passing to the Ear, than those which are nearer, by reason that tho' the Passage or Motion of Light be almost instantaneous, yet the Progression or Motion of Sound is temporary, and requires a certain sensible Time to pass a sensible Space, and the Times are proportionably longer, as the Spaces passed are greater. But a second Cause of the Duration of the Thunder, I conceive, proceeds from Echoes that are rebounded both from Parts of the Earth, and likewise Parts of the Air, or from charged Clouds, of both which I am sufficiently assured, both by natural Reasoning, and from sensible Observations; and I have observed much the same Effect produced by the echoing
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and rebounding of the Sound of a Piece of Ordnance, from Places at several Distances, adapted for the Production of such Repercussions.

But thirdly, we have also the Power and Violence of the Force of the Fire and Expansion in firing several Things that are combustible, in suddenly melting of Metals and other Materials, which are difficult and flow enough otherwise to be made to flow, in rending, tearing, throwing down and destroying whatever stands in its Way, and the like; and after all, that which causeth these and many other strange Effects resembling those of Gunpowder, seem to be nothing but a Vapour or Steam, mixed with the Body of the Air, which is kindled not by any actual Fire, but by a Kind of Fermentation, or inward Working of the said Vapour.

Again we find, that the *Pulvis Fulminans*, as 'tis called, which hath some of its Materials differing from that of common Powder, as also *Aurum Fulminans*, which is yet more differing, both as to its Materials, and as to its Way of kindling, have yet most of the same Effects with Gunpowder, both as to the flashing and thundering Noise, and as to

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the Force or Violence. So that as these are differing in many Particulars, and yet produce much the same Effects, so it is probable, that what is the Cause of Earthquakes, and subterraneous Thundring, Lightning, and violent Expansion, as I may so call those Phænomena observable in those Crises of Nature, may be in divers Particulars differing from every one of these, both as to the Materials, and as to the Form and Manner of Accension, and yet as to the Effects they may be very analogous and similar.

So that tho' we possibly cannot prove what the Materials are, yet the Effects speak them to be somewhat analogous to those of Gunpowder, or *Pulvis Fulminans*, *Aurum Fulminans*, or Lightning, which, tho' they seem very differing in many Particulars, yet when we come to view the Cause and Reasons of those Effects, it will be manifest, that it is but one Operation in Nature, and that which causes the Effect in one, causes the Effect in all the rest ; and the outward Appearances of the differing Materials, and the differing Way of operating, are nothing but the Habits and Dresses, and Vizards of the Actors,
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and the differing Modes and Dances, by which they act their several Parts, which, when they have done, they are at an End, and have exerted their whole Power, and there must be a new Set of Actors to do the same Thing again. The Oil of the Lamp will be turned all into Flame, but you must have fresh Oil, if you will have the Flame continued.

So the Materials that make the subterraneous Flame or Fire, or Expansion, let us call it by which Name we please, is consumed, and converted to another Substance, not fit to produce any more the same Effect; and if the Conflagration be so great as to consume all the present Store, we might safely conclude, that Place would no more be troubled with such Effects; but if there be Remainders left, either already fit and prepared, but sheltered from Accension, by other interposing incombustible Materials, or that there be other Parts not thoroughly ripe, and sufficiently prepared for such Accension, then a Concurrence of After-causes may repeat the same Effects, and that *toties quoties*, till all the Mine be exhausted, which I look upon as a Thing not only possible, but

probable, nay, necessary ; for that we find it to be the general Method of Nature, which is always going forward, and continually making a Progress of changing all Things from the State in which it finds them in at the present ; all Things as they proceed to their Perfection, so they proceed also to their Dissolution and Corruption, as to their preceding Estate ; and where Nature repeats the Process, 'tis always on a new Individual.

These Considerations may serve to give a fair and probable Account of the general Causes of Earthquakes, and will appear still the more credible, when Mention is made of an Experiment actually tried, in order to discover how far these Principles might be relied on. We are informed in the History of the *French Academy of Sciences* for the Year 1700, that Mr. *Lemery* made a Paste of equal Quantities of Sulphur pounded, and Filings of Iron mixed with Water, of which he put about Thirty Pounds into a Vessel, and then buried the Vessel about a Foot deep in the Earth. In the Space of eight or nine Hours the Earth began to swell, to heave up, and at last burst, when a
thick

thick sulphureous Vapour rushed out with great Violence, and at last flamed. We may add to this, that vast Quantities of Sulphur mixed with some Pieces of Metal, which, upon a close Examination, have been found to be Iron, are dispersed by the Eruptions of the burning Mountains *Vesuvius* and *Ætna*.

It is easy to collect from hence, that as there is hardly any Country in which these Minerals are not found, so there is hardly any Region of which we have distinct Accounts, where, at some Time or other, Earthquakes have not happen'd, tho' at the same Time it must be allowed, and the same Method of Reasoning will enable us to comprehend, that some Countries also are more subject to them than others.

But not to dwell longer upon Generals, the History of Earthquakes is indeed a very large and copious Subject, and might afford Matter for many Volumes ; however, it is not perhaps impossible to represent within a narrow Compass, the capital Points of such a History, and to illustrate them with proper Instances, which is all that is proposed in this little Work. That we may do this with more Ease to ourselves,
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and to the Reader, we will, according to the Circumstances attending them, distinguish Earthquakes into their different Kinds.

The *first* of these is, where the Earth lying level with the Sea, has been, by the Force of such subterraneous Fermentations, as we have described, raised often many Feet, sometimes several Fathoms above that Level. We have many Instances of this in our own Country, where the best Writers of natural History tell us, that in the County of *Norfolk* near St. *Bennet's* in the *Holm*, are perfect Cockles and Periwinkles, sometimes digged up out of the Earth, which makes some think it was formerly overflowed by the Sea. The fenny Grounds also of *Lincolnshire* and *Cheshire* seem to have proceeded from the rising of the Ground; and those in *Anglesey*, where lop'd trees are now dug up with the perfect Strokes of the Axe remaining on them, seem to have been first sunk under Water, then over-turned and buried in their own Earth, and afterwards the whole Earth seems to have been raised again to its former height.

The *next* kind of Earthquake is where the Bottom of the Sea, from the same
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Causes, is elevated to such a Degree as to be raised above its Superficies, so as to become not only visible but firm and dry Land. We have a notable Instance of this in the Island of *St. Michael*, one of the *Canaries*, related by the famous Jesuit *Athanasius Kircher*, which Relation of his brought within a reasonable Compass, runs thus, “ June 26th, 1638, “ the whole Island began to be shaken “ by Earthquakes for eight Days; so “ that the Inhabitants left Cities, Castles, “ and Houses, but especially those of “ a Place called *Vargen*, where the Motion was more violent; after which “ Earthquake this Prodigy followed, at “ a Place of the Sea where Fishermen “ used to fish in Summer, because of “ the great Abundance of Fish there “ caught, called *La Femera*, about six “ Miles from *Pico Delle Cramerine*, upon the first Sunday of July, a subterraneous Fire, notwithstanding the “ Weight and Depth of the Sea in that “ Place, which was one hundred and “ twenty feet, as the Fishermen had “ often before that found by sounding, “ the Multitude of Waters, which one “ would have thought sufficient to have “ quenched the Fire.

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“ A subterraneous Fire, I say, broke
 “ out with a most inexpressible Vio-
 “ lence, carrying up into the Clouds
 “ with it Water, Sand, Earth, Stones,
 “ and other vast great Bulks of Bodies
 “ which to the sad Spectators at a Dis-
 “ tance, appeared like Flocks of Wool
 “ or Cotton, and falling back upon the
 “ Surface of the Water looked like
 “ Froth. The Space of this Eruption
 “ was about as big as a space of Land
 “ that might well be sown by two
 “ Bushels of Grain. By great Provi-
 “ dence the Wind blew from the Land,
 “ otherwise the whole Island would, in
 “ all Probability, have perished by the
 “ merciless Rage of these devouring
 “ Flames; such vast Bulks of Stone were
 “ thrown up into the Air, about the
 “ height, to all Appearance, of about three
 “ Pikes lengths, that one would rather
 “ think them Mountains than Rocks;
 “ and what added farther to this dreadful
 “ Sight was, that these Mountains re-
 “ turning again, often met with others
 “ ascending, or being thrown up, and
 “ were thereby dash’d into a thousand
 “ Pieces, divers of which Pieces being
 “ afterwards taken up and bruised, ea-
 “ sily turned into a black shining sand.

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“ Out of the great Multitude and Va-
 “ riety of these vast ejected Bodies,
 “ and the immense Heaps of Rocks and
 “ Stones, after a while was formed a
 “ new Island out of the main Ocean,
 “ which at first was not above five Fur-
 “ longs over ; but very quickly, by dai-
 “ ly Accesses of new Matter, it increas-
 “ ed, after fourteen days, to an island
 “ of five Miles over. From this Erup-
 “ tion so great a Quantity of Fish was
 “ destroyed, and thrown upon the next
 “ adjoining Island, that eight of the
 “ largest Indian Galeons would not have
 “ been sufficient to contain them, which
 “ the Inhabitants, fearing lest the Stink of
 “ them might create a Plague, collect-
 “ ed and buried in deep Pits. The Stench
 “ of the Brimstone was plainly smelled
 “ at twenty-four Miles distance.”

The *third* Kind of Earthquakes is,
 where the Earth heaves up in a Plain,
 and by so heaving up produces a new
 Hill, greater or less, according to the
 Potency of that Cause from which this
 Tumification happens. We have already
 seen several Instances of this both an-
 cient and modern, from the Poet *Ovid*,
 and our learned Divine Mr. *Ray* ; but

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perhaps it may not be amiss to illustrate it yet a little further.

Our inquisitive and judicious Countryman Dr. *Childrey* tells us, that in a Parish by the Sea-side, not far from *Axbridge* in *Somersetshire*, within these One hundred and fifty Years a Parcel of Land swelled up like a Hill, but on a sudden clave and fell down into the Earth, and in the Place of it remains a great Pool. Our *English* Chronicles say, at *Oxenball* in the Bishoprick of *Durham*, on *Christmas* Day 1679, the Ground heaved up aloft like a Tower, and continued all that Day immoveable, till Evening, and then fell with a horrible Noise, sinking into the Earth, and leaving three deep Pits, called *Hell Kettles*. *Varenius* tells us of a new Mountain likewise raised in *Java* in the Year 1588, with the like Effects of those formerly mentioned of the new Mountain ; first shaking the Earth, then heaving and throwing up into the Air the upper Parts of the Earth, afterwards the Rock and inner Parts, then fiery Coals and Cinders, overwhelming the circumjacent Fields and Towns, and killing above ten thousand Men, and burning what was not overwhelmed.

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“ bout is all singed and burnt. Also
 “ there are Places wherein there are
 “ Wells, the Water whereof is so hot,
 “ that it will boil an Egg, as if it were
 “ over a Fire.”

The *fourth* Species of Earthquakes is, where the Parts of the Earth are raised by an Accession of fresh Earth lifted up and laid upon it, of which, kind History affords an infinite Number of Examples, and that almost in every Country, and under very different Climates. We shall mention only a few. That learned Northern Writer *Olaus Wormius*, in his *Musæum*, has an extraordinary Relation of this kind, wherein he gives an Account of an Earthquake in *Iceland*, which filled the Air with Dust, Earth, and Cinders, and overwhelmed Towns, Fields, and even Ships, a good way distant on the Sea, and which sent forth its Fumes with such violence and plenty, as covered all the Decks and Sails of Ships lying on the Coast of *Norway*, some hundred Leagues distant. Another Instance of the like kind, we shall take from the History of *Peru*, written by a Descendant from the old Imperial Family ; but previous to this, it will be requisite to let the Reader know, that we ascribe all
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earthy Rains to this Cause, tho' they fall at a great Distance from the Place where the Eruption happens.

“ I might add, says the princely Au-
 “ thor, to these Earthquakes, what hap-
 “ pened in the Year 1600 at *Arequipa*,
 “ by the raining of Sand, as also of
 “ Ashes, during twenty Days, from a
 “ *Vulcano* breaking forth: The Ashes
 “ falling in many Places above a Yard
 “ thick, in some more than two, and
 “ where least, above a quarter of a Yard;
 “ which buried the Corn-grounds of
 “ Maize and Wheat, the Boughs of Trees
 “ were broken and rendred fruitless, and
 “ the Cattle, great and small, dyed for
 “ want of Pasture. For the Sand which
 “ rained, covered the Fields thirty
 “ Leagues one way, and above forty
 “ Leagues another way; round about
 “ *Arequipa* they found their Kine dead,
 “ by Five hundred together, in several
 “ Herds, and whole Flocks of Sheep,
 “ and Herds of Goats and Swine buried.
 “ Houses fell with the Weight of the
 “ Sand, others cost much Industry to
 “ save them; mighty Thunders and
 “ Lightnings were heard and seen thirty
 “ Leagues about *Arequipa*. It was so
 “ dark whilst those Showers lasted, that
 “ at

“ at Mid-day they burned Candles to
“ see to do Business.”

The *fifth* kind of Earthquakes is, where the Earth sinks down, either from a Hill into a Valley, or where in Consequence of an Earthquake, instead of firm Ground, there appears a Lake of salt Water; of this, many Instances have happened in our own Country. Dr. *Childrey* whom we have mentioned before, affords us no less than three; the first fell out *August* the fourth 1585, after a very violent Storm of Thunder and Rain, at *Mottingham* in *Kent*, eight Miles from *London*; the Ground suddenly began to sink, and three great Elms growing upon it were carried so deep into the Earth, that no part of them could any more be seen. The Hole left, saith the Story, is in Compass eight Yards about, and a Line of fifty Fathoms plummed into it, finds no Bottom.

The second happened *December* the Eighteenth 1596, a Mile and a half from *Westream*, Southward, which is not many Miles from *Mottingham*, a part of an Hedge of Ashes-trees, twelve Perches long, were sunk six Foot and a half deep, the next Morning fifteen Foot
more

more, the third Morning, eighty Foot more at least, and so daily.

And presently after he says, moreover in one Part of the plain Field, there is a great Hole made by sinking of the Earth, to the Depth of thirty Foot at least, being in Breadth in some Places two Perches over, and in Length five or six Perches. There are fundry other sinkings in divers other Places; one of sixty Foot, another of forty-seven, and another of thirty-four Foot, by means of which Confusion, it is come to pass, that where the highest Hills were, there be the lowest Dales, and the lowest Dales are become the highest Grounds.

His third Instance is this, *July* the eighth 1657, about three of the Clock, in the Parish of *Bickly*, was heard a very great Noise like Thunder afar off, which was much wondered at, because the Sky was clear, and no Appearance of a Cloud. Shortly after, saith the Author of this Relation, a Neighbour came to me, and told me I should see a very strange Thing, if I would go with him. So coming into a Field called the *Ley-field*, we found a very great Bank of
Earth,

Earth, which had many tall Oaks growing on it, quite sunk into the Ground, Trees and all. At first we durst not go near it, because the Earth, for near twenty Yards about, was exceedingly rent and seemed just ready to fall. But since that time, myself and some others have ventured to see the Bottom, I meant to go to the Brink, so as to discern the visible Bottom, which is Water, and conceived to be about thirty Yards from us, under which is sunk all the Earth about it, for sixteen Yards round at least, three tall Oaks, a very tall Awber, and certain other small Trees, and not a Sprig of them to be seen above Water. Four or five Oaks more are expected to fall every Moment, and a great Quantity of Land is like to fall, indeed never ceasing more or less, and when any considerable Clod falls, it is much like the Report of a Cannon. We can discern the Ground hollow, above the Water, a great Depth, but how far hollow, or how deep, is not to be found out by Man. Some of the Water, as I have been told, drawn out of this Pit by a Bucket, was found to be as salt as Sea-water, &c.

We

We may add to these, another Instance of the like Kind in *Wales*, for two Miles East from *Brecknock*, is a Meer called *Llinsavathan*, which, as the People dwelling there say, was once a City, but that the City was swallowed up by an Earthquake, and this Water or Lake succeeded in the Place. The Lake is encompassed with high steep Hills, which renders this Account more probable. Near *Falkirk*, saith *Lithgow* the Scots Traveller, remains the Ruins and Marks of a Town, swallowed up into the Earth by an Earthquake, and the void Place is filled with Water. We might with Ease collect from foreign Histories a Multitude of Facts of the same Nature, but as many will necessarily occur to the learned Reader's Mind, it will be sufficient to add the following Extract from a private Letter, dated from *Balasora*, in the *East-Indies*, from Mr. *Powell* to his Father in-law Mr. *Daniel*, on *London Bridge*, *January* the 6th, 1665. “ We have had several
 “ Earthquakes unusual here, which with
 “ hideous Noises, have in several Places
 “ broke out, and swallowed up Houses
 “ and Towns. But about seven Days
 “ Journey from *Ducca*, where were at
 “ that Time three or four *Dutch*,
 F “ they

“ they and the Natives relate, that in
 “ the Market Place, the Earth trembled
 “ about thirty-two Days and Nights
 “ without Intermiffion. At the latter
 “ End, in the Market Place, the Ground
 “ turned round as Duft in a Whirl-
 “ wind, and fo continued feveral Days
 “ and Nights, and fwallowed up feve-
 “ ral Men, who were Spectators, who
 “ funk and twined round with the
 “ Earth, as in a Quagmire. At laft
 “ the Earth worked and caft up a great
 “ Fish, bigger than hath been feen in
 “ this Country, which the People
 “ caught: But the Conclufion of all
 “ was, that the Earth funk with three
 “ hundred Houfes, and all the Men,
 “ where now appears a large Lake
 “ fome Fathoms deep. About a Mile
 “ from this Town, was a Lake full of
 “ Fish, which in thefe thirty-two Days
 “ of the Earthquake, caft up all her
 “ Fish on dry Land, where might have
 “ been gathered many, which had run
 “ out of the Water upon dry Land, and
 “ there died: But when the other great
 “ Lake appeared, this former dried up,
 “ and is now become firm Land.”

The *fifth* Kind of Earthquakes, is
 where Land lying level, finks fuddenly
 and

and violently, leaving either a vast Chasm, or a deep Lake in its Place. We have had some Instances of this within the Compass of our own Island, particularly in the Neighbourhood of *Winchelsea*; and the Loss of Earl *Goodwin's* Lands, may be attributed to the same Cause. There is a very particular Account of an Earthquake of the same Kind, in *Stowe's Annals*, which runs thus.

“ On *Wednesday, April* the 6th, 1580,
 “ about Six in the Evening, a sudden
 “ Earthquake happened in *London*, and
 “ almost generally throughout *England*,
 “ caused such amazedness of the Peo-
 “ ple as was wonderful for that Time,
 “ and caused them to make their earn-
 “ est Prayers unto Almighty God. The
 “ great Clock-bell in the Palace at *West-*
 “ *minster*, struck of itself against the
 “ Hammer, with shaking; as divers
 “ Clocks and Bells in the City and else-
 “ where did the like; the Gentlemen of
 “ the *Temple* being at Supper, ran from
 “ the Tables, and out of their Hall,
 “ with their Knives in their Hands; a
 “ Piece of the *Temple Church* fell down,
 “ some Stones fell from *St. Paul's*
 “ Church; and at *Christ's Church*, in

‘ the Sermon-while, a great Stone fell
 ‘ from the Top of the Church, which
 ‘ killed on the Spot, one *Thomas Grey*,
 “ Apprentice, and another Stone also
 “ bruised his Fellow-servant, named *Is-
 “ bel Everet*, so that she lived but four
 “ Days after ; several others were sore
 “ hurt with running out of the Church,
 “ divers Chimnies in the City, Part of
 “ them fell down the Houses were so
 “ shaken. The Earthquake continued
 “ in or about *London*, not passing one
 “ Minute of an Hour, and was no more
 “ felt ; but Eastward in *Kent*, and on
 “ the Sea Coast it was felt three Times,
 “ as at *Sandwich*, at six of the Clock,
 “ the Land not only quaked, but the
 “ Sea, so that the Ships tottered.”

“ At *Dover* also, at the same Hour, was
 the like, so that a Piece of the Cliff
 fell into the Sea, with also a Piece of the
 Castle-wall there ; a Piece of *Saltwood*
 Castle, in *Kent*, fell down ; and in the
 Church of *Hide* the Bells were heard to
 sound. A Piece of *Sutton* Church in *Kent*
 fell down, the Earthquake being there
 both heard and felt. And in all these Places,
 and other in *East-Kent*, the same was
 felt three Times to move, *to wit*, at six,
 at nine, and at eleven of the Clock.”

We

We have also two later Instances of the same Nature, of which the Reader will receive a satisfactory Narrative in two private Letters following, written at the very Time the Thing happened.

Deal, Sept. 9th. 1692. “ Yesterday the
 “ People of this Place and Country
 “ were under a great Consternation,
 “ occasioned by an Earthquake, which
 “ began precisely at two of the Clock in
 “ the Afternoon, and continued about
 “ six Minutes, during which Time the
 “ Houses shook ; Pewter, Brasses, and
 “ other Kitchen Goods, totter’d from
 “ the Shelves ; empty Glass Bottles,
 “ where they lay, dash’d one against
 “ another ; Beds and Tables in the
 “ Houses shook so much, that People
 “ could not for that Time write ; some
 “ Chimnies fell, and several Houses
 “ were shaken. This was at *Canterbury*,
 “ *Sandwich*, and many Villages there-
 “ abouts ; tho’ not so violent, yet we had
 “ the same at *Deal*, particularly at *Deal*
 “ Castle ; altho’ the Wall thereof be of
 “ a vast Thickness and Strength, yet it
 “ shook so much, that the Inhabitants
 “ thereof thought it would have fallen on
 “ their Heads. In *Deal* Town several
 “ Houses shook, and so all the Country
 “ over ;

“ over ; some Houses ready to tumble
 “ down, others safe, and felt nothing. In
 “ this several Chimnies fell, and some
 “ Houses much damnified.

Portsmouth, Sept. 9th. 1692. “ Here
 “ fell much Rain yesterday, and be-
 “ tween two and three in the After-
 “ noon this Town and Point for about
 “ three Minutes had a very sensible
 “ Touch of an Earthquake, to the
 “ great Terror and Affrightment of ma-
 “ ny. The Tower of the Church,
 “ with many Houses, were found to
 “ shake considerably ; but blessed be
 “ God I hear not of the least Damage,
 “ nor any Thing more felt thereof since.”

The *seventh* Species of Earth-
 quakes consists of such as are less
 known and consider'd than any of the
 rest, I mean of the sinking of the
 Parts at the Bottom of the Sea, by
 which Abysses and Whirlpools are
 occasioned. That such Earthquakes
 there are, tho' from the Place in
 which they happen, they pass in a
 Manner totally without Observation ;
 we may notwithstanding be fully con-
 vinced, if we consider from how
 great a Depth these Eruptions pro-
 ceed ; and how little Distinction they
 make

make between Mountains and Plains, as to the Weight of removing, we may easily believe that the Bottom of the Sea is as subject to these Mutations as the Parts of the Land. And since by the former Relations we have many Instances of the raising of the Bottom of the Sea, 'tis very probable, that what Quantity of Matter is thrown to, and raised in one Place, is sunk, and falls into the Cavity left in another. An Island cannot be raised in one Place, without leaving an Abyſs in another. And I do not doubt but there have been as many Earthquakes in the Parts of the Earth under the Ocean, as there have been in the Parts of the dry Land : But being for the most Part, till of late, unfrequented by Mankind, and even now but very thinly, 'tis almost a thousand to one, that what happen are never seen, and a hundred to one, if they have been seen, whether they be recorded.

Yet there wants not such kind of Evidence as the Nature of the Fact requires to support it, since that there are great Inequalities in the Depth of the Sea equivalent to the different Heights on Shore, the Observations which Seamen make by the Lead sufficiently inform us : In-
stead

stead of Hills they find deep Holes, Bottomless Pits and Whirlpools may be compared to lofty Mountains, and those Kind of spiry Rocks, which we call *Pikes*, as that of *Teneriffe*, for Instance.

In the Relation we have of Sir *Francis Drake's* Voyage round the World, we are told that in the *Streights* of *Magellan*, they, with five hundred Fathoms of Line, felt no Land. In another Place it is said they struck upon a Rock, which was but six Feet under Water at Ebb, and yet close by there was no Bottom to be found : We may be sure this Rock did not grow originally in that Position, but that the Sand and Earth formerly adhering to it, were first broken by an Earthquake, and then dislodg'd by the Water.

But to put the Thing out of Doubt, we will mention the Earthquake that happened at *Genoa*, *July* the 2d, 1703. This was so inconsiderable as not to be perceived by any but those that were at Work in the *Mole*, and on board the Gallies ; and they without any Storm, or other Circumstance of Note, perceived the Sea sink six Feet at once, within the Harbour, and the Gallies touched the Bot-

Ground. It is plain that this must have been owing to an Earthquake, that by opening some vast Gulphs at the Bottom occasioned this sudden absorbing so great a Quantity of Water.

The Relations we had of this Earthquake mentioned some other Particulars worth Notice, tho' they happened not in the Sea, but upon Land. The sulphurous Water, which is in the Road from *Rome* to *Tivoli*, diminished two Feet and a half in Height, both in the Bason and in the Ditch. In many Places of the Plain called *Il Testino*, there were Springs and Rivulets of Water which formed impassable Marshes, but all dried up. The Water of a Lake called *Inferno*, diminish'd also three Feet in Height. Instead of the old Springs, which ceased, there came new ones about a League distant from the first, so that in all Likelihood those very Waters have changed their Course.

One might conjecture from hence, that even these Waters had a Communication with the Sea, since otherwise it is very difficult to apprehend how they came to correspond so exactly with it, not only in their failing, but in their Recovery. However, this being some-

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somewhat beside our present Purpose, we shall not dwell upon it any longer, but proceed to another Relation, still more conclusive to our Point, printed by Authority at *Bridgetown*, in *Barbadoes*, and bearing Date *April* the 23d, 1690. "About three Weeks since there were felt most violent Earthquakes in the *Leeward Islands* of *Montserrat*, *Nevis*, and *Antigua*: In the two first no considerable Hurt was done, most of their Buildings being of Timber; but where there were Stone Buildings, they were generally thrown down, which fell very hard in *Antigua*, most of their Houses, Sugar Mills, and Windmills, being of Stone."

"This Earthquake was felt in some Places of this Island, but did no Manner of Hurt to Men or Cattle; nor was any lost in the *Leeward Islands*, it happening in the Day-time. It is reported to have been yet more violent in *Martinico*, and other *French* Islands. And several Sloops which came from *Nevis* and *Antigua*, passing betwen *St. Lucia* and *Martinico*, felt it at Sea. The Agitation of the Water being so violent, that they thought themselves on Rocks and Shelves, the Vessels shaking as if they

they would break in Pieces. And others passing by a stony, and uninhabited Island called *Rotunda*, found the Earthquake so violent there, that a great Part of the rocky Island split, and tumbled into the Sea, and was there sunk, making a Noise as of many Cannon, and a very great Cloud of Dust ascending into the Air at the Fall."

The *eighth* Species of Earthquakes is, where over and above the raising and sinking the Parts of the Earth, there are a great Variety of other Accidents attending; such for Instance, as appears in that Relation, which the learned *Camden* gives us, of a very famous Earthquake in *Herefordshire*, where in the Year 1571, *Marcley Hill*, in the East part of the Shire, with a roaring Noise, removed itself from the Place where it stood, and for three Days together travelled from its old Seat.

It began first to take its Journey, *February* 17th, being *Saturday*, at six of the Clock at Night, and by seven the next Morning, it had gone forty Paces, carrying with it Sheep in their Cotes, Hedge-rows and Trees, whereof some were overturned, some that stood upon the Plain are firmly growing upon the

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Hill,

Hill, those that were East were turned West, and those in the West were set in the East ; in this Remove, it overthrew *Kinaston* Chapel, and turned two Highways near an hundred Yards from their old Paths. The Quantiy of Ground thus removed, was about twenty-fix Acres, which opening itself with Rocks and all, bore the Earth before it, for four hundred Yards space, without any stay, leaving Pasturage in places of the Tillage, and the Tillage overspread with Pasturage : Lastly, overwhelming its lower Parts, it mounted to a Hill of twelve Fathoms high, and there rested, after three Days Travel.

We have another Relation much to this Purpose in *Stowe*, “ that on the 13th of *January* 1583, in the Parish of *Armitage*, in a Place called *Blackmore* in *Dorsetshire*, a piece of Ground containing three Acres, removed from the Place where it was planted, and was carried clean over another Close, where Alder and Willow Trees grew, the space of forty Perches, every Perch containing fifteen Foot, and hath stopt up a Highway, that directed toward the Market Town of *Cerne* ; and yet notwithstanding. the Hedges wherewith it was inclosed,

closed, invironed it still, and the Trees stand thereon bolt upright, saving one Oak that is well nigh twenty Goads, remaineth; the Place where this Ground had its being, is left like unto a great Pit."

Let us conclude what we have to say, with respect to this Species, by a Relation far more remarkable than the last, taken from the *Dutch Haerlem Courant*, dated *October* the 2d 1699: " Our
 " Letters from *Batavia* in the *East-*
 " *Indies*, of the Eighth of *February*,
 " say, that on the fifth of *January*,
 " about two in the Morning, a most
 " terrible Earthquake happened, which
 " was so violent, that One and twenty
 " brick Houses, and twenty others were
 " overturned, so that if it had lasted a
 " little longer, they must have been all
 " thrown down. About forty or fifty
 " Persons were buried alive, under the
 " Ruins of the Houses that fell, and
 " near the same Number were lamed.
 " Some small time before the Earth-
 " quake, the *Blue Mountain*, otherwise
 " called Mount *Sales*, burst with such
 " a terrible Flame and Noise, that it
 " was both seen and heard there, tho'
 " six Days Journey distant. Next
 " Morning,

“ Morning, the River which falls into
 “ the Sea here, and has its rise from
 “ that Mountain, became very high and
 “ muddy, and brought down abundance
 “ of Bushes and Trees half burnt, and
 “ the Passage being stopt, the Water
 “ overflowed the Country round, all the
 “ Gardens about the Town, and some
 “ of the Streets, so that the Fish lay
 “ dead in them : It was a whole Month
 “ before the River could be cleansed,
 “ altho’ three thousand Indians were
 “ daily employed to clear the same, du-
 “ ring which time, we were obliged to
 “ fetch fresh Water from *Bantam*,
 “ which is forty Miles. All the Fish
 “ in the River, except the Carps, were
 “ killed by the Mud and dirty Water :
 “ A great Number of drown’d Buf-
 “ faloes, Tygers, Rhinocero’s, Deer,
 “ Apes, and other wild Beasts, were
 “ brought down by the Current ; and
 “ notwithstanding a Crocodile is am-
 “ phibious, several of them were found
 “ dead among the rest.” We might
 very easily add to these, many other
 Relations, such as that of the famous
 Earthquake in *Jamaica*, but that we
 purposely avoid mentioning such Events
 as are commonly known, and cannot
 fail

tail of occurring to every one's Memory, whenever this Subject is mentioned.

The *ninth* Kind of Earthquakes is, where the Effects produced have been of a milder Nature, so that the Shock has been rather attended with Terror, than Mischief, and sometimes has been so slight, as to leave it in some measure doubtful, whether there happened any Earthquake or not. Of this kind, God be praised, have been most of those which have happened in this Island, within the Compass of our Memory; for that they have been heretofore more fatal, the foregoing Relations fully prove. The inquisitive and indefatigable Dr. *Plot* is of Opinion, that by some accidental mixtures of Sulphur and Nitre in the Coal Mines, there is made a true natural Gunpowder, which explodes when it takes Fire, with much greater Force and Noise than the artificial; and of this, he gives us two Instances in *Staffordshire*.

“The first happened in the Christmas time 1677, about Eleven at Night, which came with a Noise plainly to be heard; before the Shaking, it was considerable about *Willenball* near *Wolverhampton*, but very short, giving the
Earth

Earth but one shock, and moving, as they thought by the Noise, from South to North. The same Earthquake was felt also at *Hanbury*, upon the Confines of *Derbyshire*; but as Mr. *Villiers* of that Town, a sober, grave Gentleman, assured me, it happened there about Eight in the Evening, which argues its Motion must be from East to West, and very slow, or else not the same Earthquake; neither whereof can certainly be concluded; for that nobody knows in what Meanders, the Caverns of the Earth run, nor with what Obstacles it might meet by the way, to retard and prolong the Time of its Motion."

"November the fourth 1678, there happened another Earthquake in this County, it was most dreadful of any I could hear of about *Brewood*, whither it came with a Noise not like a Clap, but a flat rumbling distant Thunder, yet so great, that it wakened People in their Beds, at Eleven a Clock in the Night, about what time it begun, and continued till towards Two in the Morning; the Earth moving very sensibly three Times, at about half an Hour's distance each Motion from the other. The Night following there happened

pened another, but not so great; yet not without Noise, as I suppose very few do, if any, it must be where the Fire damps, kindle so deep in the Earth, that the Explosion cannot be heard through so dense a Body, as it may be thence to the Superficies, tho' the Convulsion may be sensible.

That which was felt at *Oxon*, about seven in the Morning, *September* the seventeenth 1683, was also accompanied with a Noise like distant Thunder, the murmuring Sound preceding the Shock, about two Seconds of time. *October* the ninth, in the same Year, about Eleven at Night, there happened another in *Staffordshire*, and all the adjoining Counties, which, as I have it from good Hands, was not without a Noise neither; whence I conclude, that few or none happen without, and that all of them have their Origin from the kindling and Explosion of Fire damps.

In a Letter from the Reverend Mr. *Pascall*, to the most ingenious Dr. *Hooke*, we have a very clear and precise Account of such an Earthquake, which happened at *Chedsey* in *Somersetshire*, dated *January* the fourth 1680, in these Words: *Worthy Sir*, Yesterday about
H seven

seven in the Morning, I being about to rise, took Notice of what seemed a smart Gust of Wind, which was followed with a Jog of our House, and that immediately with a very sensible Shaking of the House, and particularly the Bed in which I lay. I doubted the Fall of some large Piece of Timber or Stonework, and caused the Servants to make diligent Search all about for the Cause of it, tho' not without suspicion, that it might be an Earthquake. Before Night I became fully satisfied that it was so, for my Neighbours, many observed the like in their Houses, tho' no hurt was done. This Day I hear that it was in other Parishes, one within a Mile of me, lying in the same Level; another above four Miles from me, lying on the further side of an Hill, and which is a firm Rock. This Afternoon comes a Letter from an Acquaintance of mine in *Bridgewater*, two Miles from me, and on the other side of their navigable River, which says thus.

“ I suppose you heard of the Earth-
 “ quake which happened with us this
 “ Morning about seven o' Clock. It
 “ shook our strong Stone House so, that
 “ I began to look whether the Walls
 “ were not scattered or crased with a
 “ Noise

“ Noise as if some very great thing had
 “ fallen upon the Ground. One or two
 “ in *Eastover*, a Part of that Town, on
 “ our Side the River, were ready to
 “ leap out of Bed upon it, &c.” The
 Air was very calm, as being a frosty
 Morning upon the Snow lying, which
 fell the Day before. It lasted but a very
 short Time. I do not remember for
 these eighteen Years of my Abode here,
 to have known any such thing; but I
 call to mind the Observation of *Acosta*
 and others, that they do most common-
 ly happen in Places near the Sea, and
 such is our Country, of which I meet
 many Arguments which persuade me
 that it was in these Parts of it formerly
 gained from the Sea.

To these I shall add one other short
 Relation, written by the ingenious and
 accurate *M. de la Hire*, and which is in-
 serted in the Philosophical Memoirs of
 the Royal Academy of Sciences at *Paris*;
 his Words are, these, — “ *October* the
 “ 6th, 1711, at 8 in the Evening, an
 “ Earthquake was perceived only in my
 “ Apartment at the Observatory; and
 “ one of the principal Signs of it was,
 “ that the great Rings of a Copper Cis-
 “ tern struck against the Cistern, made
 “ a good deal of Noise, and continued a

“ long time in Motion, which was ob-
 “ served by all who were in the Place ;
 “ but I did not mention it then, because
 “ I suspected that this Cistern, which
 “ had a good deal of Water in it, might
 “ have slipped a little upon its Frame ;
 “ and that a small Motion of the Water
 “ might have given one to the Cif-
 “ tern, sufficient to make the Rings
 “ strike against the Body. But some
 “ Days afterwards we received Letters
 “ out of the Country, thirty Leagues
 “ from *Paris*, by which we have been
 “ informed of an Earthquake which was
 “ felt there, and had terrified the People
 “ of the Place ; and it was on the same
 “ Day, and at the same Hour, that we
 “ perceived it at the Observatory. We
 “ have had Accounts of it also from other
 “ Places, where it was very consider-
 “ able.”

In the same Paper he enlarges very
 much upon these Matters, and chiefly on
 the Earthquake which was felt at *Basil*,
 of which Mr. *Bernoulli* had sent him a
 very exact Relation, and this is the Re-
 sult of it. There were two Shocks of
 this Earthquake at but a little Distance
 from each other, *February* the 9th. be-
 tween four and five in the Morning.
 We felt one at *Paris*, *October* the 6th.
 at

at eight in the Evening ; whence we see, that the Causes of these Earthquakes were very distant. At *Basil* the Earthquake was preceded by a very violent South Wind, like a Tempest or Hurricane, which was accompanied by an extraordinary Heat in this Season of the Year, tho' it was very cold before. At that Time all the Snow, which was very deep upon the Ground, was melted in less than two Hours, and all the Rivers, and the *Rhine* itself, increased extraordinarily, which had not been seen till then ; but when this Wind ceased, the Cold began again, and there fell a very great Quantity of Snow, to the Height of two Cubits. These are his own Words. Mr. *Scheuchzer* observes, that the same Accidents of Wind and Heat were also observed at *Zurich* ; but he does not say the Earthquake was felt there ; he only adds, that at the same Time he observed the Height of the Barometer to be twenty-five Inches, eleven Lines. In the last Place, he relates, that the Fruits of the Earth did not ripen well in his Neighbourhood. To these we might add another Species of *imperceptible Earthquakes*, for no doubt there may happen, and indeed there certainly does happen, great Con-
vul-

vulsions in the Bowels of the Earth; which occasion considerable Alterations in the superincumbent Parts, of which we who live upon them, have no Notice at all, till long afterwards, when in consequence of the mouldering and Decay, caused, if I may be allowed the Expression, by such silent Earthquakes, great Rocks, or large Pieces from the Sides of Hills, are detached and tumbled down without any visible Effect of an Earthquake at the Time of their falling. It might be probably something of this Kind that produced the Accident which happened some Years ago at *Scarborough Spaw*; and after the same Manner we may account, with great Probability, at least, for a Multitude of Events which are very astonishing to the Generality of Mankind.

In reasoning about Earthquakes, we must always remember this, that the Vapours by which they are caused, are lodged very deep in the Earth, and pass through Caverns of which we have no Notice, and with which it is impossible we should have any Communication. That this is a Matter of Fact, and not a mere Conjecture, hazarded without Proof, will appear from several of the foregoing Relations, in which Accounts
are

are given of the vast Depths of those new Lakes that are produced by Earthquakes, which beyond all Contradiction shew, that the Vaults forced open by the Explosion of nitro-sulphureous Vapours, are of almost inconceivable *Capacity*, since they not only receive in some Cases great Mountains, with every Thing that either grows or is constructed upon them, but bury them quite beyond our reach.

We may also perceive, that the subterraneous Passages communicate with each other, to a prodigious Extent, as is evident from the last Narrative, which renders it highly probable, that the same Vapours produce an Earthquake at *Basil*, in *Switzerland*, and some Months after, a fainter Succussion in the Neighbourhood of *Paris*, and even beyond it. But then this happened upon the Continent, and perhaps there is no arguing in the same Manner with Respect to Islands, that are at any considerable Distance from the Continent.

I say perhaps, and also add the Word considerable, because tho' many judicious Persons thought the contrary, yet there is incontestible Evidence to prove such a Communication between the subterraneous Caverns in *Italy* and *Sicily*. It is
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an old, and for any thing we know to the contrary, may be a true Notion, that this very Island, upon which we live, was separated by an Earthquake from *France*, and it is with still greater Probability presumed, that the Islands of *Scilly* were produced in the like Manner.

That this is very far from being impossible will appear to any Man, who considers that the *Chinese* have a certain Record of the sinking of a vast Tract of Country, which is now stiled the Gulph of *Corea*, and separates the *Peninsula* of that Name, from the Empire of *China*. We know too, that there are Abundance of judicious Naturalists who believe, that the *Marianne* Islands, and those stiled the *New Phillipines*, which lie in the vast Ocean, between *Asia* and *America*, were produced in the same Manner, which if true, would be a strong Argument in Favour of some Continent lying to the Northward of those Islands not yet discovered, and to which so many Attempts have been made to find a short Passage by the North-east, and the North-west.

But now having said so much of innocent, imperceptible and incertain Earthquakes, it seems to be high Time
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to come to that, which we have so lately felt, and which gave Occasion to this Discourse. As yet, we have had no distinct Accounts, and indeed we have not had Time to receive any, of the Extent or Direction of this Paroxysm; but we might certainly have expected a more clear and circumstantial Relation, than any which has hitherto appeared of the Manner in which it was felt in *London*; and therefore having attended to it, with peculiar Care at the Time, I shall endeavour to set down, as plainly and as exactly as I can, what was observed in my own House.

On *Thursday, February* the 8th, 1749-50, at thirty Minutes after Twelve, four or five Persons in the lower Part of the House, felt it shake very perceptibly, and at the same Time heard a Noise so loud, that it was taken for the Motion of a Desk upon Castors in a Room over-head. A Servant-maid in the Dining-room being upon her Knees, scowering the Hearth, felt the Marble Slab rise under her. In the two Pair of Stairs, a Person writing at a Desk, felt a Table rise under his Arm, first on one Side, and immediately after on the other. Another Person in the same Room taking a Book out of a Shelf, observed the Books over it to be shaken,

and heard so great a Noise, as to occasion his calling instantly, to know what they were doing in the Garret. A Maid who was there, said it was the Door shut by the Wind, which Door, tho' it goes very hard, was indeed shut with as much Force, as if it had been done by a Person without, and yet there was nobody beside on that Floor.

The Weather had been rainy and close for some Days, there had been a thick Fog that Morning, and at the Time of the Shock the Air was very remarkably hazy and warm, and continued so all the Afternoon and Evening, insomuch, that I several Times tried, by dropping a Bit of a Paper out of a two Pair of Stairs Window, to discover whether there was any Breath of Air stirring, but the Pieces of Paper fell directly to the Ground, in the same Manner they would have done in an exhausted Receiver, except that the Motion was somewhat slower. Between Nine and Ten o'Clock at Night, the Weather was so still, that the Flame of a Candle held in the open Yard, was not perceived to be affected by the Air; all which Circumstances agree perfectly with the Description of Earthquakes in other Places.

If we enquire into the Cause of this Earthquake, perhaps it will be no improbable

probable Account of it to say, that the Winter being remarkably dry till within a few Days before, the Rain which then fell might penetrate very deep into the Earth ; and if in any of the Commons, Heaths, or barren Grounds, not far distant from this Capital, there be, as it is reported there are, Coals in the Earth ; these, if they are of a sulphureous kind, might, through their becoming wet in this Manner, emit a Vapour capable of producing such a Shock as that which was felt.

To shew that this is not a sudden Conjecture excited upon this Occasion, I will here cite the Observation of the ingenious Dr. *Childrey* to this very Purpose : “ I conceive, says he, that after
 “ great Wets the strong Tendency of
 “ the Waters downward altogether pre-
 “ seth in the Air, in the Vault on all
 “ sides, and so begets a Conflict between
 “ the Water and the Air, the Air strug-
 “ ling outrageously to free itself, which
 “ Conflict begets a Confusion ; and this
 “ Confusion must needs loosen the incum-
 “ bent Earth, and so contribute also
 “ to its falling in, if it be loose and
 “ sandy ; and I am of opinion that
 “ whensoever the Truth comes to be
 “ found out, it will appear that this tu-
 “ multuary Tendency of Waters down-

“ ward (after great Wets) pressing in
 “ the Air in hollow Places of the Earth,
 “ begets a Conflict ; and that a Concus-
 “ sion, which is what we call an Earth-
 “ quake ; so true it is that Earthquakes
 “ always succeed great Wets, or a sud-
 “ den Glut and Tempest of Rain in the
 “ Time of a great Drought.”

To this we may add, what the in-
 dustrious and indefatigable Dr. *Plot* tells
 us, in his History of *Staffordshire*, from
 the Authority of the worshipful *Dudley*
Dudley, Esq; that Small-coal with Sleek
 thrown moist together will fire, by rea-
 son of its Sulphureousness ; “ which, says
 “ he, I am inclined to believe, since I
 “ find amongst Dr. *Powers*’s Observa-
 “ tions, that the *Pyrites aureus* be-
 “ ing exposed to the moist Air, or
 “ sprinkled with Water, will smoak, and
 “ grow exceeding hot ; and if many be
 “ laid in a Heap and watered, will turn
 “ red hot of themselves, as he says he
 “ had seen them himself, whereof he
 “ acquaints us with a very unhappy Ex-
 “ ample that fell out at *Ealand*, a neigh-
 “ bouring Town to him in *Yorkshire*,
 “ where one *Wilson* having piled up
 “ many Cart Loads of them in a Barn
 “ of his, the Roof being faulty, and ad-
 “ mitting Rain Water to fall in copi-
 “ ously amongst them, they began to
 “ smoak

“ smoak, and at last to take fire, and
 “ burn like red hot Coals, so that the
 “ Town was in an Uproar about the
 “ quenching of them.”

It would be no difficult Task to assemble other Passages from Writers of great Reputation to this Purpose; but I would not willingly either tire the Reader's Patience, or suggest any thing to the Prejudice of further Enquiries. This only I will take leave to say, that after dry Weather, more especially in Winter, when hard soaking Rains follow for several Days together, they will be generally found to produce very thick Fogs, and such copious Steams of sulphurous Vapours from the Earth as generate Lightning, sometimes with, and sometimes without Thunder. When ever therefore this Kind of Weather is not attended with such Consequences, there is certainly some ground for presuming the Cause of this to be the Vapour not finding a free Passage through the Earth, at least in Proportion to its Quantity; and therefore not arising into the Air, but forcing a Passage through subterraneous Caverns, it is very consonant to Reason, that it may have the Consequence before mentioned.

As to the Effects of Earthquakes upon the Air, we find many things reported
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in Books, upon which, however, too much Weight ought not to be laid, because, without doubt, these Effects will vary according to the Climates in which the Earthquakes happen; and as to that which we have lately felt, the brisk Winds that have since followed it, may be well supposed to have brushed and purified the Air from whatever noxious Particles the Earth might expire. Neither ought this Observation to displease those who take a Pleasure in moralizing on that Event, since to Men of a religious and generous Frame of Mind, a Sense of the Divine Goodness and Mercy in preserving us from those Calamities that commonly attend the Shock of an Earthquake in other Countries, will be as strong a Motive to serious Thoughts and honest Purposes, as the Terror that might be impressed by setting such a Mark of the Instability of the Globe upon which we dwell in the fullest Light possible, and will probably last much longer. For *Fear* is a slavish Passion that ceases almost as soon as the *Rod* is withdrawn; while *Gratitude* is a noble Warmth that glows in every rational Mind from the *Recollection* of *Benefits* received; and therefore cannot be extinguished while we enjoy our *Existence*.

F I N I S.



